

ENCEPHALITIS

Encephalitis is a diffuse inflammatory condition of the brain. Major features are fever and evidence of cerebral dysfunction.

Causes

1. Acute

Japanese encephalitis (caused by group B arbovirus, i.e., flavi virus) is the common cause of epidemics. Other viral causes are: enterovirus, herpes simplex virus, cytomegalovirus, Epstein-Barr virus, rabies, etc., post exanthemata (after measles, rubella, varicella etc).

2. Subacute or chronic

HIV, subacute sclerosing panencephalitis (SSPE), CMV etc.

In India the common cause of encephalitis is JE. It occurs in epidemics and is a zoonotic disease (i.e., it mainly infects animals, man is incidental host). This disease is transmitted by culex mosquito.

Twenty-five years ago it was endemic mainly in Japan, China, and Korea. Now it has spread to south Asia (i.e., India, Sri Lanka, Burma, Indonesia etc).

Geographical distribution

World: Yearly around 40,000 cases occur with 10,000 deaths and 9000 disabilities.

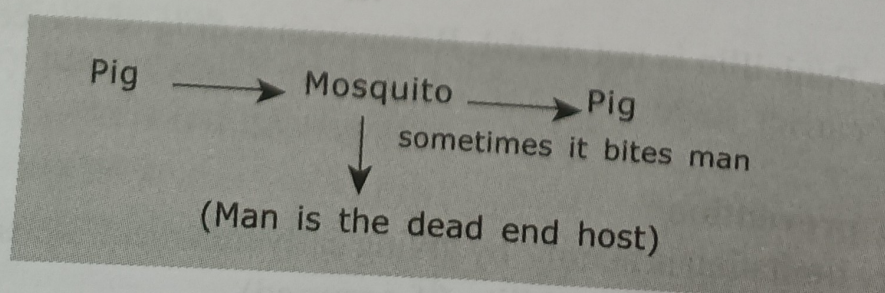
India: Yearly, 1000 to 2000 cases occur with 50–60% mortality rate. In south India nearly half of the population is having antibodies against JE (which gives us the idea of prevalence of infection).

Epidemiology

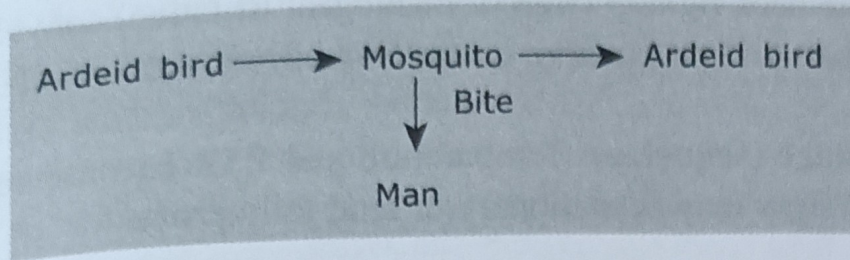
1. Agent factors

Agent: Group "B" arbovirus.

Basic cycle of transmission is:



Another cycle is:



So far, person-to-person transmission has not been recorded.

2. Host factors

Debilitated and low immune status persons are more prone to this disease.

- Age:** 85% of the cases are seen in children below 15 years age group, and above 60 years age group accounts for another 10% of cases.
- Sex:** No sex difference.
- Animal Host:** Pig is the known animal host. It is also called *amplifier* because, the infected pig does not show any symptoms of illness and the virus will multiply again and again in its body and act as a main reservoir of infection.

Other animals like cattle and buffalo may also be infected with JE virus without symptoms. Some birds like pond herons (rarely poultry and ducks) are also infected.

Reservoir of infection: Mainly pigs, sometimes birds.

Incubation period is 5–15 days.

Route of transmission: Vector transmission (by *Culex mosquito*) IP in mosquito is 9–12 days.

Ratio of inapparent infection (subclinical infection) to disease appearance is 1:300 to 1:1000.

3. Environmental factor

Poor environmental conditions which favour the growth of mosquitoes is the important factor for the spread of disease.

Clinical Features

- Prodromal stage:** Acute onset of fever, headache and malaise. Duration of this stage will be six days.

2. **Acute encephalitic stage:** Fever around 40°C , other predominant features are neck rigidity (sign of meningeal irritation) convulsions, altered sensorium and progressive coma. Sometimes signs of CNS.

3. **Late stage (sequelae):** Temperature and ESR become normal. Neurological signs may be stationary or tend to improve.

Neurological deficits may be present. Deformities may occur.

CFR (case fatality rate) is 20–40%.

Usually most of the deaths occur within nine days.

Control of JE

1. Primary prevention
 - a) Health promotion
 - b) Specific protection.
2. Secondary prevention: Early diagnosis and treatment
3. Tertiary prevention
 - a) Disability limitation
 - b) Rehabilitation

b) Rehabilitation

1. Primary Prevention

a) Health promotion

This is the main step in the prevention of JE. In the health promotion, efforts are mainly targetted to environmental sanitation and vector control (destroying mosquitoes). Mosquitoes (culex) can be killed effectively by using aerosol or ground-fogging with ultra-low-volume (ULV) insecticide (e.g., malathion, fenitrothion).

Indoor residual spray is necessary around the house, mosquito breeding sites and animal shelters of all the affected villages.

Uninfected villages which are 2–3 km near to the infected villages also needs spraying operations and these villages need surveillance also.

To avoid mosquito bites, mosquito nets and repellents are advised.

b) Specific protection

Specific protection is by vaccinating the population at risk. A killed *mouse-brain vaccine* is available.

Primary immunization: Two doses, each dose is of one mL (0.5 mL for below three years children). Interval between two doses is 7–14 days. Booster dose after few months.

- i) Route of administration is subcutaneous.
- ii) Revaccination may need after three years.
- iii) Vaccine is advised to be given during interepidemic period.

National Program for Prevention and Control of Japanese Encephalitis (JE)


This program aims to reduce the disease's impact on children by:

- Strengthening vaccination in affected areas [🔗](#)
- Improving surveillance, vector control, and case management [🔗](#)
- Increasing access to safe drinking water and sanitation [🔗](#)
- Improving nutritional status of children at risk [🔗](#)
- Increasing awareness and communication [🔗](#)

National Vector Borne Disease Control Programme (NVBDGP)

This program was established after a large outbreak in 2005 to monitor acute encephalitis syndrome (AES). The NVBDGP also developed surveillance guidelines for JE endemic states. [🔗](#)

Integrated Disease Surveillance Programme (IDSP)

This program is part of the National Health Mission (NHM) and is implemented in all states and union territories. Its goal is to detect and respond to outbreaks of epidemic-prone diseases like JE. 

Research and monitoring

The Gujarat Biotechnology Research Centre (GBRC) researches viruses that cause encephalitis and monitors the situation. The ICMR-NIV develops molecular diagnostic assays for viruses that cause human encephalitis. 